REMARKS

Applicant has carefully reviewed and considered the Office Action mailed July 11, 2007. Reconsideration of the application is respectfully requested in view of the foregoing amendments and comments set forth below.

By this Amendment, claim 1 is amended solely for the purpose of adding citations "(a) to (f)" to the recited elements. In addition, new claim 6 is added directed to the subject matter disclosed on page 8, lines 6-9 and Figure 3 of the originally filed specification. Accordingly, claims 1-6 are pending in the present application.

Claims 1-3 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,698,036 to Ishii et al. (hereinafter referred to as "Ishii") in view of U.S. Patent No. 6,388,632 to Murakawa et al. (hereinafter referred to as "Murakawa") and U.S. Patent No. 4,970,435 to Tanaka et al. (hereinafter referred to as "Tanaka"). This rejection is respectfully traversed.

Ishii is directed to a plasma processing apparatus that has a flat antenna member including a plurality of short slits concentrically or spirally arranged in the antenna. The short slits propagate microwaves into a cavity through the antenna. Similarly, Murakawa and Okuyama disclose slot-type plate antenna where microwaves are propagated into a cavity through the antenna. Nowhere does Ishii or any of the prior art of record reasonably suggest that the slots of antenna can emit evanescent microwaves. Thus, one of ordinary skill in the art exercising common sense would not have been motivated to provide Ishii with circular openings that emit evanescent microwaves into a vacuum vessel as recited in element e) of claim 1 of the present application.

The Examiner relied upon Murakawa for its teachings of openings in the second conductor plate being circular. In particular, the Examiner cites Figure 14, which is a bottom view of a supporting member, and column 7, lines 60-67 of Murakawa. As shown in Figures 12-13 of Murakawa, a lower supporting member 6c may be arranged below the slot plat 7 and the lower supporting member 6c may be formed with a plurality of circular openings 6c". That is, Murakawa teaches circular openings in a dielectric supporting member and not circular openings replacing the slots 8 of slot plate 7. Consequently, the circular openings taught by Murakawa limit microwave propagation emitted from slots 8 provided in the slot or antenna plate 7. It is respectfully submitted that one of ordinary skill in the art would not have been motivated to add a lower supporting dielectric member with circular openings as disclosed by Murakawa because the additional structure would limit the emission of microwaves and is quite different from the claimed circular openings of the claimed invention.

Further, nowhere does Murakawa or Ishii disclose that evanescent microwaves are emitted by those devices. Accordingly, even if combined, it is submitted that the claimed invention would not result because there is no reason to modify the shape of the antenna slots with the shape of openings in a supporting member.

The third reference to Tanaka was applied for its disclosure of a movable waveguide 92. Tanaka's device uses a horn antenna and the plasma is generated by the electron cyclotron resonance (ECR) method. There is no disclosure of a plurality of openings provided in a second conductor plate to emit evanescent microwaves into a vacuum vessel as recited in element e) and of second conductor plat openings being circular openings as recited in element e1) of claim 1 of the present application.

Element e2) of claim 1 of the present application recites that "the space in the coaxial waveguide is isolated from the space in the vessel by an interplanar O-ring disposed between the first conductor plate and the dielectric plate." The Examiner acknowledges that "Ishii does not teach the isolation of the resonance cavity from the vessel by availing o-rings disposed between the first conductor and dielectric plates ...". But, the Examiner references an o-ring (56) between the waveguide pipe 52 and the ceiling portion 54 of the processing container 4 and extrapolates that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to seal Ishii's resonant cavity with o-rings to maintain a hermetic boundary between the cavity and the vessel." Applicant respectfully disagrees as the sealing of the claimed invention is made for sealing the space in the coaxial waveguide and vessel, isolating the space between the central conductor (32) and the outer conductor (31) and the space in the vessel of the claimed invention. This construction cannot be obtained by combining the applied references Ishii, Murakawa, and Tanaka because none of the applied references addresses isolating the space in the coaxial waveguide from the space in the vessel by disposing an interplanar O-ring between the first conductor plate and the dielectric plate, as required by element e2) of claim 1 of the present application. Consequently, it is submitted that claims 1-3 are patentable over the combination of Ishii, Murakawa and Tanaka and withdrawal of that rejection is respectfully requested.

Claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over Ishii in view of Murakawa and Tanaka and further in view of U.S. Patent No. 6,346,915 to Okumura et al. Claim 5 was rejected under 35 U.S.C. §103(a) as being unpatentable over

Ishii in view of Murakawa and Tanaka and further in view of U.S. Patent No. 5,395,453 to Noda. These rejections are respectfully traversed.

With respect to claim 4, the antenna disclosed by Okumura et al. does not have the second conductor plate 22 as required in the claimed invention. Therefore, the plasma trap 14 taught by Okumura et al. does not extend in the direction of the second conductor as recited in claim 4. Consequently, the plasma trap taught by Okumura et al. is quite different from that of the claimed invention. One of ordinary skill in art would not have reasonably combined Ishii, Murakawa, and Tanaka with Okumura et al. and based on those teachings modified the modified Ishii disclosure to have the recited microwave emission gap. Thus, it is respectfully submitted that claim 4 is patentable over the art of record and withdrawal of that rejection is requested.

Claim 5 depends from Claim 1 and thus, Claim 5 is patentable over any combination of Ishii, Murakawa, Tanaka and Noda as those references fail to disclose elements e), e1), and e2). Withdrawal of the rejection of claim 5 is requested.

Differences in Antenna Structure Between the Claimed Invention and Applied References:

In the claimed parallel plate microwave launcher, a punched plate is employed that has a number of small holes through which microwaves can only propagate as evanescent waves. The claimed invention's launcher construction is different from other antenna disclosed in the applied combination of references. The claimed antenna structure is different from other antenna structures in that microwaves can be emitted as propagating waves through the slot antennae of the applied references. With the microwave launcher disclosed and claimed in the present application, the plasma density

can be controlled linearly with the introduced microwave power, differently from the conventional slot antenna type microwave launcher, where the plasma density is not controlled linearly but jumped according to electromagnetic wave modes. Please see the attached exemplary documents A, B, and C.

Difference in Plasma Mode:

The claimed parallel plate microwave launcher of the present application can be called a converted launcher from a coaxial waveguide. The end of the coaxial waveguide cable of the claimed microwave plasma generator constitutes a resonant cavity to feed evanescent waves. In the claimed parallel plate launcher, there is a narrow gap, typically 5mm in width, in the periphery of the circular quartz plate (recited dielectric plate) inserted in the microwave launcher. This gap plays an important role in plasma production. By controlling the microwave power or gas pressure, one can produce the surface wave plasma and the volume-wave plasma which is produced inside the chamber, far from the microwave launcher. This point is greatly different from the surface-wave plasma produced in the conventional slot antenna type microwave launcher. To control the plasma discharge mode between the surface wave and volume wave plasma (please refer to exemplary document C), the claimed structure with a gap is essential. The gap is described from page 6, line 20 through page 7, line 3 of the present specification and claimed in claim 4 of the present application.

Vacuum Sealing:

According to the claimed invention, the end of the coaxial cable is expanded and constitutes a resonant cavity to feed evanescent waves. One example has the first conductor plate having a diameter of 240 mm and the diameter of the circular openings in

the second conductor plate being 8mm. The use of the proposed internally mounted planar microwave launcher and the coaxial waveguide allows for the use of a thin large-area quartz plate to properly seal the vacuum in the vessel. This is quite different from the disclosure of the applied references. The applied references fail to disclose how the vacuum is sealed. The claimed invention solved the problem of sealing the vacuum by using an interfacial O-ring. As a result, the claimed invention can produce a large area plasma ball in a meter diameter sized chamber using the claimed microwave launcher with a thin, large area dielectric plate. The prior art of record cannot produce a plasma ball nearly as large as that of the claimed invention.

In view of the foregoing, it is respectfully submitted that claims 1-6 are allowable over the prior art of record. Reconsideration of the application and an issuance of a Notice of Allowance are earnestly solicited.

If the Examiner is of the opinion that the prosecution of the application would be advanced by a personal interview, the Examiner is invited to telephone undersigned counsel to arrange for such an interview.

Respectfully submitted,

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